

Alaska Department of Fish and Game  
Division of Wildlife Conservation  
December 2003

# Effects of Oilfield Development on Calf Production and Survival in the Central Arctic Herd

Stephen M. Arthur  
Patricia Del Vecchio

Research Performance Report  
1 July 2002–30 June 2003  
Federal Aid in Wildlife Restoration  
Grant W-33-1, **Project 3.46**

This is a progress report on continuing research. Information may be refined at a later date.

If using information from this report, please credit author(s) and the Alaska Department of Fish and Game.

**FEDERAL AID  
ANNUAL RESEARCH PERFORMANCE REPORT**

ALASKA DEPARTMENT OF FISH AND GAME  
DIVISION OF WILDLIFE CONSERVATION  
PO Box 25526  
Juneau, AK 99802-5526

**PROJECT TITLE:** Effects of oil field development on calf production and survival in the Central Arctic Herd

**PRINCIPAL INVESTIGATOR:** Stephen M Arthur, Patricia Del Vecchio

**COOPERATORS:** ConocoPhillips Alaska, Inc., US Bureau of Land Management, US National Park Service, US Fish and Wildlife Service

**FEDERAL AID GRANT PROGRAM:** Wildlife Restoration

**GRANT AND SEGMENT NR.:** W-33-1

**PROJECT NR.:** 3.46

**WORK LOCATION:** Unit 26B

**STATE:** Alaska

**PERIOD:** 1 July 2002–30 June 2003

---

**I PROGRESS ON PROJECT OBJECTIVES**

OBJECTIVE 1: Estimate annual pregnancy and birth rates of caribou cows.

Pregnancy and birth rates were assessed by locating radiocollared cows annually during early June 2001–2003.

OBJECTIVE 2: Estimate survival of female calves to yearling age class and determine causes of mortality.

Calves were captured and radiocollared during June 2001, 2002, and 2003. Calves were monitored at approximately 2-week intervals during June–October, then located again in March and June of the following years to estimate survival rates.

OBJECTIVE 3: Estimate rates of growth and weight gain by calves during summer.

Radiocollared calves were recaptured during September and March, weighed and measured to assess growth rates.

OBJECTIVE 4: Assess changes in location, physiography, and vegetation of calving sites among years.

Location and vegetation types were recorded and photographed at initial capture sites of calves. These data will be analyzed to detect changes in location and habitat use that may occur over time.

OBJECTIVE 5: Monitor movements of caribou to determine winter and summer distributions.

Radiocollared calves were located at 2-week intervals during June–September. In addition, radiocollared cows were located during late February and early March, 2002–2003 to record winter concentration areas.

OBJECTIVE 6: Estimate size of the herd at 2–year intervals using a complete aerial photocensus.

An aerial photocensus was conducted during July 2002. The herd was estimated at 31,857 caribou.

## **II SUMMARY OF WORK COMPLETED ON JOBS IDENTIFIED IN ANNUAL PLAN THIS PERIOD**

JOB 1: Estimate annual pregnancy and birth rates of caribou cows.

Radiotracking surveys were conducted on 1–8 June 2003 to determine the proportion of cows that gave birth and the distribution of cows during the calving period. Fifty-four radiocollared adult ( $\geq 3$  years old) cows were located during this period. Thirty-seven calves were observed, and 15 cows were judged to be pregnant based on presence of antlers and distended udders. Thus, parturition rate was 96%. This is likely an overestimate, because most radiotracking was conducted on the calving grounds, and we were less likely to find nonpregnant cows that had not traveled to the calving grounds.

JOB 2: Estimate survival of female calves to yearling age class and determine causes of mortality.

Sixty neonatal calves were captured and radiocollared on 7 and 8 June 2002. Thirty calves each were captured in the eastern and western calving areas. One calf died from abandonment, possibly as a result of disturbance caused by the capture. This calf was not included in subsequent analyses. Between 14 June and 8 September, 7 additional calves died, all due to predation. Three additional calves died as a result of injuries sustained during the September capture effort, and will be excluded from subsequent survival analyses. Four more calves died in October, probably as a result of predation. Kaplan–Meier estimates of calf survival from capture through 7 September were 0.80 (95% CI = 0.66, 0.94) and 0.97 (0.90, 1.00) for calves captured in the eastern and western areas, respectively. Sixty-one additional calves were captured during 1–8 June 2003 and will be monitored during FY04. These included 16 calves (5 female, 11 male) of GPS-collared cows and 45 female calves of uncollared cows.

JOB 3: Estimate rates of growth and weight gain by calves during summer.

Weights and metatarsus lengths were recorded for all 60 calves captured in June. However, 10 calves captured in the eastern area appeared to be  $>2$  days old, based on the absence of an umbilicus, general appearance, and running ability. These calves were weighed and measured but these weights and metatarsus lengths were

not used to determine means for these measurements at birth (however, these calves were included in the determination of mean weight gain and growth between early Jun and early Sep). Mean weights of the remaining calves were 7.0 and 6.6 kg, respectively, for the eastern and western areas. Mean weight for all calves was 7.1 kg, 0.8 kg heavier than in 2001. Mean metatarsus lengths were 25.6 and 25.4 cm for the east and west areas. Mean length for all calves was 25.5 cm, 0.1 cm shorter than 2001. A second capture effort was conducted 9–12 September. Of the 53 calves thought to have survived until then, 50 were found and captured by net gun, weighed and measured (24 from the eastern calving area, 26 from the western). We discounted one western calf's weight and metatarsus measurement because this calf apparently was abandoned by its mother sometime in mid-July (possibly during the large aggregation) and it was half the size of the others. Mean weight gain was 36.2 kg and 34.8 kg for calves born in the eastern and western areas. Metatarsus lengths increased by a mean of 7.1 cm in both areas.

JOB 4: Assess changes in location, physiography, and vegetation of calving sites among years.

Locations of captures were assumed to indicate birth location, because captured calves exhibited physical and behavioral traits characteristic of newborn caribou (lack of coordination, small size, appearance of umbilicus, hooves, posture), and because caribou usually do not travel far during the first week following birth of calves. These locations were mapped and will be compared to similar data during each year of the study. Vegetation at each site was classified and photographed for future, more detailed analysis.

JOB 5: Monitor movements of caribou to determine winter and summer distributions.

Collared calves were located by aerial radiotracking at approximately 2-week intervals from June through October. Distributions of collared calves were recorded and mapped using fixed kernel utilization distribution models encompassing 50% and 99% of the utilization distributions. Summer distributions of calves caught in the 2 areas overlapped, and calves occasionally switched sides, but some degree of fidelity to each side was evident. Calves from both calving areas used western portions of the Arctic National Wildlife Refuge during late summer and fall. Proportions of collared calves that were within the refuge ranged from 0 during June to 66% ( $n = 44$ ) on 6 October. Calves were monitored until the end of October, which allowed us to document their migration and arrival at their wintering grounds.

JOB 6: Estimate size of the herd at 2-year intervals using a complete aerial photocensus.

A photocensus was completed on 16 July 2002. All 55 radiocollared calves and 75 radiocollared cows were found aggregated in 9 groups along the Arctic coast. Subsequent counts of caribou on the photos totaled 31,857 caribou, an 18% increase from the 27,000 caribou counted during the 2000 census.

### **III ADDITIONAL FEDERAL AID FUNDED WORK NOT DESCRIBED ABOVE THAT WAS ACCOMPLISHED ON THIS PROJECT DURING THIS SEGMENT PERIOD**

Using funds provided by the US Bureau of Land Management, 26 GPS-equipped collars were purchased. These were deployed on caribou cows during March 2003 as a preliminary study of the feasibility of assessing calf growth rates based on detailed data on summer movements and exposure to disturbance (see Section V). In addition, with funding provided by the US National Park Service, 65 cows and 35 calves were located on winter range during late February 2003. Twenty-five of the collared calves were captured and weighed during March.

### **IV PUBLICATIONS**

None.

### **V RECOMMENDATIONS FOR THIS PROJECT**

Fieldwork is scheduled to continue during 2003–2005. In addition, we have proposed expanding this study to use detailed data on caribou movements to develop spatially explicit models of caribou exposure to anthropogenic disturbance. In addition to demographic and physiological data, we will collect detailed data on spring, summer, and fall movements and exposure of caribou to industrial activity to investigate the influence of oil field development on caribou population dynamics. Objectives of this study are to:

- 1 Estimate annual rates of calf production, survival, and growth.
- 2 Determine distributions of pregnant caribou cows during the calving period each year.
- 3 Monitor movements of cow–calf pairs every 5 hours during spring, summer, and fall.
- 4 Examine the relationships among demographic parameters (Objective 1) and birth location, habitat characteristics, and movements, and exposure to human activity.
- 5 Investigate the potential for human activities to influence caribou movements during late summer and fall.
- 6 Document distribution of CAH caribou throughout the year.

The US Bureau of Land Management has committed significant funding to this project and we are currently attempting to obtain the remaining required funds.

### **VI APPENDIX**

None.

## **VII PROJECT COSTS FOR THIS SEGMENT PERIOD**

FY03 FEDERAL AID SHARE \$ 14,400 + STATE SHARE \$ 4,800 = TOTAL \$ 19,200

Additional project expenses totaling \$161.9 were paid using non-Federal Aid funds (\$151.4 from Phillips Alaska, Inc., and \$10.5 from state funds).

### **VIII PREPARED BY:**

Stephen M. Arthur  
Wildlife Biologist III

Patricia Del Vecchio  
Wildlife Technician IV

### **SUBMITTED BY:**

Jay M. Ver Hoef  
Acting Research Coordinator

Laura A. McCarthy  
Publications Technician II

### **APPROVED BY:**

\_\_\_\_\_  
Thomas W. Paul, Federal Aid Coordinator  
Division of Wildlife Conservation

\_\_\_\_\_  
Matthew H. Robus, Director  
Division of Wildlife Conservation

**APPROVAL DATE:** \_\_\_\_\_